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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the lubricating oil composition in which mist-eliminator capability is used for the rotation gas-compression machine which has a mist-eliminator system which is less than stray mist quantity [ of  $0.02\text{g/Nm} ]^3$  in detail about the lubricating oil composition for rotation gas-compression machines.

[0002]

[Description of the Prior Art]Air, nitrogen gas, oxygen gas, ammonia gas, carbon dioxide, hydrocarbon gas, About the lubricating oil used for rotary compressors, such as a blade type aiming at compression of gaseous substances, such as a combustion gas and combustion gas, a screw type, and a scroll type, development which put the power point on reduction of improvement \*\* sludge generating of \*\* oxidation stability has been furthered conventionally.

[0003]By so, the selection of an antioxidant and the concomitant use technology of an antioxidant which what blended antioxidants, such as a hindered phenol system and an aromatic amine system, with base oil, such as advanced purified mineral oil, is main as for the conventional lubricating oil for rotation gas-compression machines, and are used. The sludge generation resulting from the lubricating oil itself has been reduced to a limit.

[0004]

[Problem to be solved by the invention]The sludge precursor (precursor) or the sludge itself which was mixed from the outside on the other hand for example, it did not originate in the lubricating oil itself is caught by the filter which exists in the middle of the compressed gas style in a compressor, and there is a possibility of causing clogging of the filter. However, since the stray mist quantity which the result filter nominal value aperture of the filter used for the conventional rotation gas-compression machine is comparatively large, and cannot be caught by a mist-eliminator system as a result was more than  $0.02\text{g/Nm} ]^3$ , When the sludge generation resulting from the lubricating oil itself was fully able to decrease, there was almost no concern of filter clogging. However, the clean inclination which dislikes the mist in compressed gas becomes strong in recent years, and the clogging trouble of a filter rotation gas-compression in a plane has increased with the tendency for the fiber density of a filter to increase.

[0005]The filter clogging trouble resulting from the sludge precursor or sludge mixed from such the outside could not be solved with the conventional lubricating oil for rotation gas-compression machines, but much of

development of the new lubricating oil for rotation gas-compression machines which can solve this problem was expected. . The purpose of this invention says that mist-eliminator capability is less than stray mist quantity [ of 0.02g/Nm ] <sup>3</sup>. Even when it is used in the rotation gas-compression machine which has the extremely outstanding mist-eliminator system, it is providing the lubricating oil composition for rotation gas-compression machines which does not produce the trouble of filter clogging by sludge.

[0006]

[Means for solving problem]The result on which this invention persons put \*\*\*\*\* BE \*\*\*\*\* for the above-mentioned problem which the conventional lubricating oil for rotation gas-compression machines has, By using the lubricating oil composition which blended the specific additive agent to lubricant base oil as a lubricating oil for rotation gas-compression machines, it finds out that the above-mentioned problem is solvable, and came to complete this invention.

[0007]The invention of this invention according to claim 1 is a lubricating oil composition for rotation gas-compression machines in which mist-eliminator capability has a mist-eliminator system which is less than stray mist quantity [ of 0.02g/Nm ] <sup>3</sup>, The lubricating oil composition for rotation gas-compression machines, wherein the lubricating oil composition concerned contains one sort or two sorts or more of compounds chosen from (a) metal system cleaning agent, (b) non-ash powder medicine, and (c) distributed viscosity index improver as an indispensable ingredient is provided.

[0008]The invention of this invention according to claim 2 is a lubricating oil composition for rotation gas-compression machines in which mist-eliminator capability has a mist-eliminator system which is less than stray mist quantity [ of 0.02g/Nm ] <sup>3</sup>, The lubricating oil composition concerned one sort or two sorts or more of compounds chosen from one sort or two sorts or more of compounds chosen from (A) (a) metal system cleaning agent and (b) non-ash powder medicine, and a (B) (c) distributed viscosity index improver as an indispensable ingredient. The containing lubricating oil composition for rotation gas-compression machines is provided.

[0009]

[Mode for carrying out the invention]Hereafter, the contents of this invention are explained more to details. The lubricant base oil in particular in the lubricating oil composition for rotation gas-compression machines of this invention is not limited, and if usually used as base oil of a lubricating oil, it can be used regardless of a mineral oil system and a constructional system.

[0010]As mineral-lubricating-oil base oil, a crude oil specifically atmospheric distillation and the lubricating oil fraction produced by carrying out distillation under reduced pressure, Oils, normal paraffin, etc. which were refined combining suitably refining \*\*\*\*, such as solvent deasphalting, solvent extraction, hydrocracking, solvent dewaxing, contact dewaxing, hydrotreating, sulfuric acid treatment, and clay treatment, etc., such as paraffin series and a naphthene system, can be used.

[0011]moreover -- as constructional system lubricant base oil -- concrete -- for example, poly alpha olefin (polybutene.) Isoparaffins, such as 1-octene oligomer and 1-decene oligomer, alkylbenzene, alkyl naphthalene, and a dibasic acid ester (ditridecyl glutarate.) A di-2-ethylhexyl horse mackerel peat, diisodecyl adipate, a ditridecyl horse mackerel peat, Tribasic acid ester, such as di-2-ethylhexyl sebacate (trimellitic acid ester etc.), a polyol ester (a trimethylolpropane KAPURI rate and trimethylolpropane pelargonate.) Pentaerythritol 2-ethylhexanoate, pentaerythritol pelargonate, etc. can use polyoxy alkylene

glycol, dialkyl diphenyl ether, a polyphenyl ether, etc.

[0012]Such mineral oil system base oil and constructional system base oil may be used combining two or more sorts of base oil which may use it alone and is chosen from these with the arbitrary mixing ratio.

[0013]Although the viscosity of the lubricant base oil used in this invention is arbitrary, It excels in lubricity and cooling nature (heat removal nature), and from points, like there are few friction losses by agitating resistance, the kinetic viscosity at 40 °C is preferred, and it is usually desirable 5-150mm<sup>2</sup>/s and to use the thing of 10-110 mm<sup>2</sup>/s more preferably.

[0014]The (a) ingredient in the lubricating oil composition for rotation gas-compression machines of this invention is a metal system cleaning agent. Although the arbitrary compounds used as a metal system cleaning agent of a lubricating oil are usable as a metal system cleaning agent here, One sort or two sorts or more of metal system cleaning agents etc. which are specifically chosen from alkaline-earth-metals (a-1) sulfonate, alkali earth metal phenate (a-2), and Al (a-3) Cal earth metal salicylate are mentioned.

[0015](a-1) As alkaline-earth-metals sulfonate, The alkaline earth metal salt of the alkyl aromatic sulfonic acid more specifically obtained the molecular weights 100-1500 and by sulfonating the alkyl aromatic compounds of 200-700 preferably, for example, Especially magnesium salt and/or calcium salt are used preferably, and what is called petroleum sulfonic acid, synthetic sulfonic acid, etc. are specifically mentioned as alkyl aromatic sulfonic acid.

[0016]What is called mahogany acid etc. that carry out a byproduction as petroleum sulfonic acid at the time of what generally sulfonated the alkyl aromatic compounds of the lubricating oil fraction of mineral oil, or white oil manufacture are used. As synthetic sulfonic acid, carry out a byproduction from the alkylbenzene manufacturing plant which serves as a raw material of a detergent, for example, or, Alkylbenzene which has an alkyl group of the straight chain shape and the letter of branching which are acquired by alkylating polyolefine with benzene is used as a raw material, and what sulfonated alkyl naphthalene, such as a thing which sulfonated this, or dinonylnaphthalene, is used. Although there is no restriction in particular as a sulfonating agent at the time of sulfonating these alkyl aromatic compounds, fuming sulfuric acid and a sulfuric anhydride are usually used.

[0017](a-2) As alkali earth metal phenate, More specifically, for example The carbon numbers 4-30, the alkylphenol which has at least one alkyl group of the straight chain shape of 6-18, or the letter of branching preferably, The alkaline earth metal salt of the Mannich reaction output of the alkylphenol produced by making formaldehyde react to the alkylphenol sulfide produced by making this alkylphenol and elementary sulfur react, or this alkylphenol, Especially magnesium salt and/or calcium salt are used preferably.

[0018](a-3) As alkaline-earth-metals salicylate, The alkaline earth metal salt of the carbon numbers 4-30 and the alkyl salicylic acid which has at least one alkyl group of the straight chain shape of 6-18 or the letter of branching preferably especially magnesium salt, and/or calcium salt are more specifically used preferably.

[0019]To alkaline-earth-metals sulfonate, alkali earth metal phenate, and alkaline-earth-metals salicylate. Alkyl aromatic sulfonic acid, alkylphenol, alkylphenol sulfide, The Mannich reaction thing of alkylphenol, alkyl salicylic acid, etc., Make it react to alkaline-earth-metal-salt groups, such as an oxide of the alkaline-earth metals of magnesium and/or calcium, and hydroxide, directly, or. Or not only in the neutral salt (normal salt) obtained by making it replace by alkaline earth metal salt once it considers it as alkaline metal salt, such as sodium salt and potassium salt, etc., The basic salt obtained by furthermore heating these neutral salt

(normal salt), superfluous alkaline earth metal salt, and an alkaline-earth-metal-salt group (hydroxide and the oxide of alkaline-earth metals) under existence of water, The overbased salt (ultrabasic salt) obtained by making neutral salt (normal salt) react to the base of alkaline-earth metals under existence of carbon dioxide is also contained.

[0020]These reactions are usually \*\*\*\*\* in solvents (aromatic hydrocarbon solvents, such as aliphatic hydrocarbon solvents, such as hexane, and xylene, light lubricant base oil, etc.). Although the metal system cleaning agent is usually marketed in the state where it diluted with light lubricant base oil etc. and is available, generally it is desirable 1.0 to 20 mass % and for the metal content to use the thing of 2.0 - 16 mass % preferably.

[0021]Although the total basicity of the metal system cleaning agent to be used is arbitrary, it is desirable for the total basicity to usually use the thing of 50 - 400 mgKOH/g more preferably 20 to 450 mgKOH/g zero to 500 mgKOH/g from the point of excelling in filter clogging tightness.

[0022]The total basicity here means the total basicity by the perchloric acid method measured based on 7. of JIS K 2501 "petroleum-products and lubricating oil-neutralization number test-method."

[0023]The (b) ingredient in the lubricating oil composition for rotation gas-compression machines of this invention is non-ash powder medicine. Although the arbitrary compounds used as non-ash powder medicine of a lubricating oil are usable as non-ash powder medicine here, Specifically, the carbon numbers 40-400, the nitrogen-containing compound which has the alkyl group or alkenyl group of 60-350 in [ at least one ] a molecule preferably, or its derivative is mentioned.

[0024]As this alkyl group or an alkenyl group, Although straight chain shape or the letter of branching may be sufficient, as a desirable thing, the letter alkyl group of branching and the letter alkenyl group of branching which are derived from oligomer of olefins, such as propylene, 1-butene, and isobutylene, or co-oligomer of ethylene and propylene are mentioned.

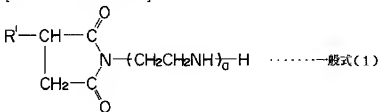
[0025]moreover -- from the point of excelling in filter clogging tightness although the nitrogen content of the non-ash powder medicine of the (b) ingredient is also arbitrary -- usually -- the nitrogen content -- 0.01 - 10 mass % -- the thing of 0.1 - 10 mass % is used desirably preferably.

[0026](b) The succinimid which specifically has the alkyl group or alkenyl group of the carbon numbers (b-1) 40-400 in [ at least one ] a molecule as an ingredient, Or the benzylamine which has the alkyl group or alkenyl group of the derivative (b-2) carbon numbers 40-400 in [ at least one ] a molecule, Or one sort or two sorts or more of compounds etc. which are chosen from the polyamine which has the alkyl group or alkenyl group of the derivative (b-3) carbon numbers 40-400 in [ at least one ] a molecule, or its derivative are mentioned.

[0027](b-1) The compound more specifically expressed with the following general formula (1) or (2) as succinimid is mentioned.

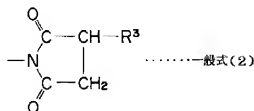
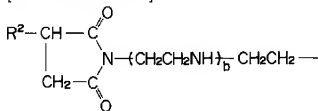
[0028]

[Chemical formula 1]



[0029]

[Chemical formula 2]



[0030]the inside of the above (1) and (2) types --  $\text{R}^1$ ,  $\text{R}^2$ , and  $\text{R}^3$  -- separate -- the carbon numbers 40-400 -- the alkyl group or alkenyl group of 60-350 is shown preferably -- a -- 1-5 -- desirable -- the number of 2-4 -- b -- 0-4 -- the number of 1-3 is shown preferably, respectively.

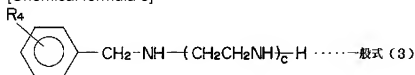
[0031]Although the manufacturing method of this succinimid is not limited at all, for example A propylene oligomer, After making polyolefines, such as polybutene and ethylene-propylene copolymerization, react to a maleic anhydride and obtaining anhydrous alkenyl succinic acid, What was imide-ized using polyamine, such as diethylenetriamine, triethylenetetramine, tetraethylenepentamine, and pentaethylene hexane, is mentioned.

[0032]Imide-ization is faced at succinimid, Although there are so-called succinimid of a monotype like (1) type which the succinic anhydride added to the end of polyamine, and what is called a screw type like (2) types which the succinic anhydride added to the both ends of polyamine of succinimid, (b-1) As an ingredient, the either of these mixtures is also usable.

[0033](b-2) The compound expressed with the more concrete for example, following general formula (3) as benzylamine is mentioned.

[0034]

[Chemical formula 3]



[0035]the inside of the above-mentioned (3) types --  $\text{R}^4$  -- the carbon numbers 40-400 -- the alkyl group or alkenyl group of 60-350 is shown preferably -- c -- 1-5 -- the number of 2-4 is shown preferably, respectively.

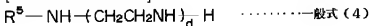
[0036]Although the manufacturing method of this benzylamine is not limited at all. For example, after making polyolefines, such as a propylene oligomer, polybutene, and ethylene-propylene copolymerization, react to phenol and considering it as alkylphenol, It can obtain by making polyamine, such as formaldehyde, diethylenetriamine, triethylenetetramine, tetraethylenepentamine, and pentaethylenhexamine, react to this

by a Mannich reaction.

[0037](b-3) The compound expressed with the more concrete for example, following general formula (4) as polyamine is mentioned.

[0038]

[Chemical formula 4]



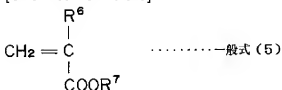
[0039]the inside of the above-mentioned (4) types --  $R^5$  -- the carbon numbers 40-400 -- the alkyl group or alkenyl group of 60-350 is shown preferably -- d -- 1-5 -- the number of 2-4 is shown preferably, respectively.

[0040]Although the manufacturing method of this polyamine is not limited at all. For example, after chlorinating polyolefines, such as a propylene oligomer, polybutene, and ethylene-propylene copolymerization, It can obtain by making polyamine, such as ammonia, ethylenediamine, diethylenetriamine, triethylenetetramine, tetraethylenepentamine, and pentaethylenhexamine, react to this.

[0041]As a (b) ingredient of this invention, the derivative of these nitrogen-containing compounds is also used preferably. As a derivative of an ingredient, to these nitrogen-containing compounds, specifically (b) The monocarboxylic acid (fatty acid etc.) of the carbon numbers 2-30, The polycarboxylic acid of the carbon numbers 2-30 of oxalic acid, phthalic acid, trimellitic acid, pyromellitic acid, etc. is made to act, Neutralize a part or all of the amino group and/or imino group which remain, or, What is called an amidated acid denaturation compound; Boric acid is made to act on these nitrogen-containing compounds, . Neutralized a part or all of the amino group and/or imino group which remain. What is called a boron denaturation compound; denaturation compound; etc. which combined two or more sorts of denaturation chosen as what is called sulfur denaturation compound; which made the sulfur compound act on these nitrogen-containing compounds, and these nitrogen-containing compounds from acid denaturation, boron denaturation, and sulfur denaturation are mentioned.

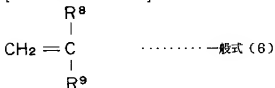
[0042]The (c) ingredient in the lubricating oil composition for rotation gas-compression machines of this invention is a distributed viscosity index improver. One sort or two sorts of monomers chosen from the compounds expressed with the concrete for example, following (c-1) general formula (5), (6), or (7) although the arbitrary compounds used as a distributed viscosity index improver of a lubricating oil are usable as a distributed viscosity index improver here [0043]

[Chemical formula 5]



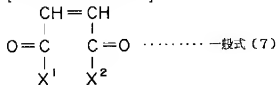
[0044]

[Chemical formula 6]



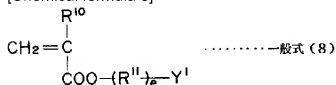
[0045]

[Chemical formula 7]




[0046] One sort or two sorts or more of nitrogen-containing monomers (c-2) chosen from the compounds expressed with the following general formula (8) or (9) [0047]



[Chemical formula 8]




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

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

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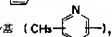
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

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

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

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
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
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

[Chemical formula 9]




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

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

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
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

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

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

ピロリノ基 (  ), ピリジル基 (  ),


メチルピリジル基 (  ),

ピロリジニル基 (  ),  $\text{HN}-$  (  ),

ピペリジニル基 (  ),  $\text{HN}-$  (  ),

キノニル基 (  ), ピロリドニル基 (  ),

ピロリドノ基 (  ), イミダゾリノ基 (  ),

ピラジノ基 (  ) などが挙げられる。 )

The copolymer produced by carrying out copolymerization or its hydride can mention.

[0049] (5)  $\text{R}^6$  and  $\text{R}^8$  among a formula, (6) types, and (7) types, Separately, a hydrogen atom or a methyl group is shown,  $\text{R}^7$  shows the alkyl group of the carbon numbers 1-18, and  $\text{R}^9$  is shown, and the hydrocarbon group of the carbon numbers 1-12  $\text{X}^1$  and  $\text{X}^2$ , Separately A hydrogen atom, The residue ( $-\text{OR}^{13}$ ;  $\text{R}^{13}$  shows the alkyl group of the carbon numbers 1-18) of alkyl alcohol of the carbon numbers 1-18 or the residue ( $-\text{NHR}^{14}$ ;  $\text{R}^{14}$  shows the alkyl group of the carbon numbers 1-18) of monoalkyl amine of the carbon numbers 1-18 is shown, respectively.

[0050] As an alkyl group of the carbon numbers 1-18 of  $\text{R}^7$ ,  $\text{R}^{13}$ , and  $\text{R}^{14}$ , Specifically separately For example, a methyl group, an ethyl group, n-propyl group, An isopropyl group, n-butyl group, an isobutyl group, a sec-butyl group, A tert-butyl group, a straight chain or the pentyl group of branching, a straight chain, or the hexyl group of branching, A straight chain or the heptyl group of branching, a straight chain or the octyl group of branching, a straight chain, or the nonyl group of branching, A straight chain or the decyl group of branching, a straight chain or the undecyl group of branching, a straight chain, and the dodecyl of



branching, A straight chain or the tridecyl group of branching, a straight chain or the tetradecyl group of branching, a straight chain or the pentadecyl group of branching, a straight chain or the hexadecyl group of branching, a straight chain or the heptadecyl group of branching, a straight chain, or the octadecyl group of branching is mentioned.

[0051]As  $R^9$ , specifically For example, a methyl group, an ethyl group, n-propyl group, an isopropyl group, n-butyl group, an isobutyl group, a sec-butyl group, A tert-butyl group, a straight chain or the pentyl group of branching, a straight chain, or the hexyl group of branching, Alkyl groups, such as a straight chain or the heptyl group of branching, a straight chain or the octyl group of branching, a straight chain or the nonyl group of branching, a straight chain or a decyl group of branching, a straight chain or an undecyl group of branching, a straight chain, or dodecyl of branching : [0052]A straight chain and the butenyl group of branching, a straight chain or the pentenyl group of branching, a straight chain, or the hexenyl group of branching, A straight chain or the heptenyl group of branching, a straight chain or the octenyl group of branching, a straight chain, or the nonenyl group of branching, Alkenyl groups, such as a straight chain or a decenyl group of branching, a straight chain or an undecenyl group of branching, a straight chain, or a dodecenyl group of branching; cycloalkyl group of the carbon numbers 5-7 of a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, etc.;

[0053]A methyl cyclopentyl group, a dimethyl cyclopentyl group (all the structural isomer is included), A methylethyl cyclopentyl group (all the structural isomer is included), a diethyl cyclopentyl group (all the structural isomer is included), A methylcyclohexyl group, a dimethyl cyclohexyl group (all the structural isomer is included), A methylethyl cyclohexyl group (all the structural isomer is included), a diethyl cyclohexyl group (all the structural isomer is included), Alkyl cycloalkyl group of the carbon numbers 6-11 of a methyl cycloheptyl group, a dimethyl cycloheptyl group (all the structural isomer is included), a methylethyl cycloheptyl group (all the structural isomer is included), a diethyl cycloheptyl group (all the structural isomer is included), etc.;

[0054]Aryl groups, such as a phenyl group and a naphthyl group : A tolyl group (all the structural isomer is included), A xyl group (all the structural isomer is included), an ethyl phenyl group (all the structural isomer is included), A straight chain or the propyl phenyl group of branching (all the structural isomer is included), Each alkyl aryl group of the carbon numbers 7-12, such as a straight chain or a butylphenyl group (all the structural isomer is included) of branching, a straight chain or a pentyl phenyl group (all the structural isomer is included) of branching, a straight chain, or a hexyl phenyl group (all the structural isomer is included) of branching;

[0055]The Ben Schill group, a phenylethyl group, a FUYUNIRU propyl group (the isomer of a propyl group is included), Each arylated alkyl group [ of the carbon numbers 7-12, such as a phenylbutyl group (the isomer of a butyl group is included), a phenyl pentyl group (the isomer of a pentyl group is included), and a phenyl hexyl group (the isomer of a hexyl group is included), ]; etc. are mentioned.

[0056](c-1) As a thing desirable as a monomer of an ingredient, Specifically, one to carbon number 18 alkyl acrylate, the carbon number 1 - 18 alkyl methacrylate, the olefin of the carbon numbers 2-20, styrene, methylstyrene, maleic anhydride ester, maleic anhydride amide, these mixtures, etc. are mentioned.

[0057]On the other hand,  $R^{10}$  and  $R^{12}$  among (8) types and (9) types, Separately, a hydrogen atom or a methyl group is shown,  $R^{11}$  shows the alkylene group of the carbon numbers 2-18, e shows the integer of 0

or 1, and Y<sup>1</sup> and Y<sup>2</sup> show separately the amine residue or heterocyclic residue which contains 1-2 pieces and 0-2 oxygen atoms for a nitrogen atom, respectively.

[0058]As R<sup>11</sup>, specifically For example, a straight chain or the ethylene of branching, A straight chain or the propylene group of branching, a straight chain or the butylene group of branching, a straight chain, or the pentylene group of branching, A straight chain or the hexylene group of branching, a straight chain or the heptylene group of branching, a straight chain, or the octylene group of branching, A straight chain or the nonylene group of branching, a straight chain or the decylene group of branching, a straight chain, or the undecylene group of branching, A straight chain or the dodecylene group of branching, a straight chain or the tridecylene group of branching, a straight chain or the tetradecylene group of branching, a straight chain or the pentadecylene group of branching, a straight chain or the hexadecylene group of branching, a straight chain or the heptadecylene group of branching, a straight chain, or the octadecylene group of branching is mentioned.

[0059](c-2) As a thing desirable as a nitrogen-containing monomer of an ingredient, Specifically For example, dimethylamino methyl methacrylate, diethylamino methyl methacrylate, Dimethylaminoethyl methacrylate, diethylamino ethyl methacrylate, 2-methyl-5-vinylpyridine, morpholino methyl methacrylate, morpholino ethyl methacrylate, N-vinyl pyrrolidone, these mixtures, etc. are mentioned. That is, the distributed viscosity index improver in this invention means the copolymer which makes comonomer a nitrogen-containing monomer like the above-mentioned ingredient (c-2).

[0060]The distributed viscosity index improver which is the (c) ingredient of this invention can be obtained by carrying out copolymerization of one sort or two sorts or more of monomers chosen from the aforementioned (c-1) ingredients, and one sort or two sorts or more of nitrogen-containing monomers chosen from ingredients (c-2). Although the mole ratio of the ingredient (c-1) in the case of copolymerization and an ingredient (c-2) is arbitrary, generally it is 80:20 to about 95:5. Although the reaction method of copolymerization is also arbitrary, a copolymer is usually easily obtained by carrying out radical solution polymerization of an ingredient (c-1) and the ingredient (c-2) under existence of polymerization initiators, such as benzoyl peroxide.

[0061]Although the weight average molecular weight of the distributed viscosity index improver of the (c) ingredient is also arbitrary, it is usually desirable 1,000-300,000, and to use the thing of 5,000-100,000 preferably.

[0062]Especially as a (c) ingredient of this invention, from the point of excelling in filter clogging tightness and water separability. Weight average molecular weight The distributed polymethacrylate of 5,000-100,000, Weight average molecular weight A 5,000 - 100,000 distributed styrene maleic-anhydride-ester copolymer, The distributed olefin copolymerization of 5,000-100,000 is used for weight average molecular weight, and weight average molecular weight is preferably used for distributed olefin methacrylate copolymers, these mixtures, etc. of 5,000-100,000.

[0063]The lubricating oil composition for rotation gas-compression machines of this invention contains one sort or two sorts or more of compounds chosen from the above-mentioned (a) ingredient, the (b) ingredient, and the (c) ingredient as an indispensable ingredient.

[0064]Although the content of the ingredient in a lubricating oil composition is arbitrary, usually, the content (the (a) ingredient.) from the point of excelling in filter clogging tightness and water separability (b) When

using together two or more sorts of compounds chosen from an ingredient and the (c) ingredient, as for the total content, it is preferred that it is 0.001 - 10.0 mass % on a constituent whole-quantity standard, it is more preferred that it is 0.01 - 7.0 mass %, and it is preferred that it is especially 0.05 - 5.0 mass %.

[0065]In this invention furthermore, By containing one sort or two sorts or more of compounds chosen from one sort or two sorts or more of compounds chosen as a lubricating oil composition from (A) (a) metal system cleaning agent and (b) non-ash powder medicine, and a (B) (c) distributed viscosity index improver as an indispensable ingredient, further, The lubricating oil composition for rotation gas-compression machines excellent in filter clogging tightness can be obtained.

[0066]Although the content of the (A) ingredient in this case and the (B) ingredient is also arbitrary, Usually, the content (when using together two or more sorts of compounds chosen from the (a) ingredient and the (b) ingredient, it is the total content) of the (A) ingredient, It is preferred that it is 0.001 to 10.0 mass % on the point of excelling in filter clogging tightness and water separability to a constituent whole-quantity standard, it is more preferred that it is 0.01 to 7.0 mass %, and it is preferred that it is especially 0.05 to 5.0 mass %. On the other hand, the content (when using together two or more sorts of compounds chosen from the (c) ingredients, it is the total content) of the (B) ingredient, It is preferred that it is 0.001 to 10.0 mass % on the point of excelling in filter clogging tightness and water separability to a constituent whole-quantity standard, it is more preferred that it is 0.01 to 7.0 mass %, and it is preferred that it is especially 0.05 to 5.0 mass %.

[0067]In the lubricating oil composition for rotation gas-compression machines of this invention, It can also be used in the form which is the purpose of improving the various performances further, and is independent about still more publicly known lubricating oil additive, for example, an antioxidant, a rust preventives, corrosion inhibitor, an antiwear agent, pour point depressant, a defoaming agent, etc., or was combined in some numbers.

[0068]It is usable if it is used to a lubricating oil generally [ a phenol system compound, an amine compound, etc. ] as an antioxidant. Specifically Alkylphenols, such as 2,6-di-tert-butyl-4-methyl phenol. Bisphenols, such as a methylene-4,4-screw (2,6-di-tert-butyl-4-methyl phenol). Dialkyl phosphorodithioate zinc, such as naphthylamines, such as phenyl alpha-naphthylamine, dialkyl diphenylamine, and di-2-ethylhexyl dithiophosphate zinc, is mentioned.

[0069]Specifically as a rust preventives, fatty amines, organic phosphite, organophosphate, organic-sulfonic-acid metal salt, organic phosphorus acid metal salt, alkenyl succinate, multivalent alcohol ester, etc. are mentioned.

[0070]Specifically as corrosion inhibitor, the compound of a benzotriazol system, a thiadiazole system, and an imidazole series, etc. are mentioned.

[0071]As an antiwear agent, a sulfur-systems compound and a phosphorus system compound can be used, for example. As a sulfur-systems compound, disulfide, olefins sulfide, and sulfurized oil fat specifically again as a phosphorus system compound, Specifically, the salt of monoester phosphate, diester phosphate, trialkyl phosphate, phosphorous acid monoester, phosphorous acid diester, phosphorous acid triester and such ester species, and amines and alkanolamines, etc. are mentioned.

[0072]Polymer etc. of a polymethacrylate system which specifically suits the lubricant base oil to be used as pour point depressant are mentioned.

[0073]As a defoaming agent, silicone, such as dimethyl silicone, is specifically mentioned.

[0074]Although the addition of these publicly known additive agents is arbitrary, When using it, the content

on a lubricating oil composition whole-quantity standard in an antioxidant. Usually, 0.01 to 5.0 mass %; in a rust preventives and corrosion inhibitor. Usually, it is desirable to usually blend with 0.1-5.0 mass %; pour point depressant, with a 0.01-3.0 mass %; antiwear agent, at a 0.05-5.0 mass %; defoaming agent, respectively so that it may become 0.01 - 0.05 mass %.

[0075]The lubricating oil composition for rotation gas-compression machines of this invention is that for which mist-eliminator capability is used in the rotation gas-compression machine which has a mist-eliminator system which is less than stray mist quantity [ of  $0.02\text{g/Nm}^3$  ].<sup>3</sup> As long as this condition is fulfilled as a rotation gas-compression machine, it is applicable to the gas-compression machine using arbitrary rotation compression technology, such as a vane type, a screw type, and a scroll type.

[0076]The gas in particular used as a compression object is not limited, either, and it can apply to arbitrary gas, such as air, nitrogen gas, oxygen gas, ammonia gas, carbon dioxide, hydrocarbon gas, a combustion gas, and combustion gas.

[0077]The mist-eliminator capability as used in the field of this invention with the rotation gas-compression machine which has a mist-eliminator system of less than stray mist quantity [ of  $0.02\text{g/Nm}^3$  ].<sup>3</sup> The stray mist quantity which is contained in the discharged gas which passed the mist-eliminator system which a rotation gas-compression machine has and which is measured by the following methods means the rotation gas-compression machine which is less than  $0.02\text{g/Nm}^3$  ].<sup>3</sup>

[0078]. Namely, are shown in drawing 1 at the exit (delivery of the gas after the mist-eliminator system passage which a compressor has) of 1. rotation gas-compression machine. The stray mist quantity measuring device equipped with the filters 5 and 6 for stray mist uptake of two reams (Mai Chloe Lessa micro note type filter 1144-2 and 3C-EY which is a filter for oil removal made from both CKD are used) is combined. Before combination, after putting each filters 5 and 6 for stray mist uptake into a 50 \*\* dry desiccator beforehand for 24 hours, weighing is carried out, and the dry weight (g) is measured.

[0079]2. Close the valves 1 and 2 of a stray mist quantity measuring device, and open the valves 3 and 4, and the discharged gas of a rotation gas-compression machine passes along the bypass line 9.

[0080]3. Check that the discharging gas temperature in through and the gas flowmeter 7 has turned into constant temperature (regular temperature state) continuously in the discharged gas of a rotation gas-compression machine for 2 hours or more at the bypass line 9.

[0081]4. Open the valves 1 and 2 of a stray mist quantity measuring device after checking that discharged gas is a regular temperature state, and close the valves 3 and 4, and make it the discharged gas of a rotation gas-compression machine pass succeeding [ for 24 hours ] the filters 5 and 6 for stray mist uptake which are 2 reams. The total amount of passing gas ( $\text{m}^3$ ) and discharging gas temperature (\*\*) of the gas flowmeter 7 are recorded in this case, and the total amount of passing gas in the normal condition ( $\text{Nm}^3$ ) is calculated.

[0082]5. Carry out weighing after putting the filters 5 and 6 for stray mist uptake after an examination into a 50 \*\* dry desiccator for 24 hours, and find the weight (g) after an examination.

[0083]6. The stray mist quantity ( $\text{g/Nm}^3$ ) of the rotation gas-compression machine examined with the following formula is calculated. A recovered oil daily dose (g) is a difference of the total weight (g) after two examinations of the filters 5 and 6 for stray mist uptake, and the total weight (g) before an examination.

[0084]In drawing 1, 8 shows a temperature sensor, w shows the distance of piping between a compressor

exit and filter 5 entrance for stray mist uptake, and w is less than 1 m.

[0085]

回収油分量 (g)

$$\text{ストレーミスト量 (g/Nm}^3\text{)} = \frac{\text{標準状態での総通過ガス量 (Nm}^3\text{)}}{\text{回収油分量 (g)}}$$

[0086]

[Working example] Hereafter, although an embodiment and a comparative example explain the contents of this invention still more concretely, this invention is not limited to these contents at all.

[0087] (Embodiments 1-8) About the lubricating oil composition for rotation gas-compression machines concerning this invention of the presentation shown in Table 1, the filter differential pressure monitor examination shown below was done. The result was written together to Table 1.

[0088] (Comparative example 1) The examination with the same said of the constituent of the presentation shown in Table 1 which does not use the ingredient of this invention was done again for comparison. The result was described in Table 1.

[0089] [Filter differential pressure monitor examination] Kobe Steel, Ltd. make rotation gas-compression machine KST6P (the stray mist quantity measured by the above-mentioned method is  $0.01\text{g/Nm}^3$ ) is run continuously using the lubricating oil composition for rotation gas-compression machines of Embodiments 1-8 and the comparative example 1, The differential pressure (kPa) in the mist filter order which the compressor concerned at the time of operation-time 3000-hour progress and 6000-hour progress equipments was measured.

[0090]

[Table 1]

			実施例								比較例
			1	2	3	4	5	6	7	8	1
組成 (質量 %)	基油	水素化精製鉱油 <sup>1)</sup>	98.4	98.4	98.4	98.4	98.4	98.7	98.5	98.5	98.9
	(a) 成分	中性石油系 C <sub>α</sub> 277+8トA <sup>2)</sup>	0.5	—	—	—	—	—	—	—	—
		過塩基性石油系 C <sub>α</sub> 277+8トB <sup>3)</sup>	—	0.5	—	—	—	—	—	—	—
		中性 C <sub>α</sub> フェネートA <sup>4)</sup>	—	—	0.5	—	—	—	—	—	—
		過塩基性 C <sub>α</sub> フェネートB <sup>5)</sup>	—	—	—	0.5	—	—	0.3	—	—
	(b) 成分	アルケニルコハク酸イミドA <sup>6)</sup>	—	—	—	—	0.5	—	—	0.3	—
	(c) 成分	分散型粘度指数向上剤A <sup>7)</sup>	—	—	—	—	—	0.2	0.1	0.1	—
その他		酸化防止剤 <sup>8)</sup>	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		きび止め剤 <sup>9)</sup>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
フィルタ差圧試験		運転時間 3000 h r	50	40	50	40	40	40	30	30	100
(kPa)		運転時間 6000 h r	100	70	100	70	70	60	80	60	200

1) 動粘度 92mm<sup>2</sup>/s (40℃)

2) 全塩基価 (過塩素酸法) 20mg KOH/g、カルシウム含有量 2.5質量%

3) 全塩基価 (過塩素酸法) 400mg KOH/g、カルシウム含有量 16質量%

4) 全塩基価 (過塩素酸法) 250mg KOH/g、カルシウム含有量 9.3質量%

5) 全塩基価 (過塩素酸法) 70mg KOH/g、カルシウム含有量 2.0質量%

6) 炭素数 70~120 のポリブチル基を含むポリブチルコハク酸とテトラエチレンペンタミンのビスイミド (窒素含有量 2質量%)

7) 炭素数 1~28 のアルキル基を有するアルキルメタクリレートとジエチルアミノエチルメタクリレートとの共重合体 (重量平均分子量 8万、含窒素モノマー含有量 5重量%)

8) ビスフェノール系

9) アルケニルコハク酸系

[0091]As for the passage clear from the result of Table 1, the lubricating oil composition for rotation gas-compression machines concerning this invention (embodiments 1-8) has an absolute value of the filter differential pressure in a system examination, and a low increasing rate by operation-time progress compared with the constituent of the comparative example 1, and the performance outstanding to filter clogging prevention is shown. When the (a) ingredient and the (c) ingredient are used together (embodiment 7), and when the (b) ingredient and the (c) ingredient are used together (embodiment 8), the more outstanding filter clogging preventive effect is shown.

[0092]

[Effect of the Invention]. The lubricating oil composition for rotation gas-compression machines of this invention says that mist-eliminator capability is less than stray mist quantity [ of  $0.02\text{g/Nm}$  ]<sup>3</sup>. Also when it is used in the rotation gas-compression machine which has the mist-eliminator capability to have excelled extremely, the outstanding performance in which the trouble resulting from filter clogging by sludge is not produced is demonstrated.

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[Translation done.]